Deuterium

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Deuterium, also called **heavy hydrogen**, is a stable isotope of hydrogen with a natural abundance of one atom in 6500 of hydrogen. The nucleus of deuterium, called a **deuteron**, contains one proton and one neutron, whereas a normal hydrogen nucleus just has one proton.

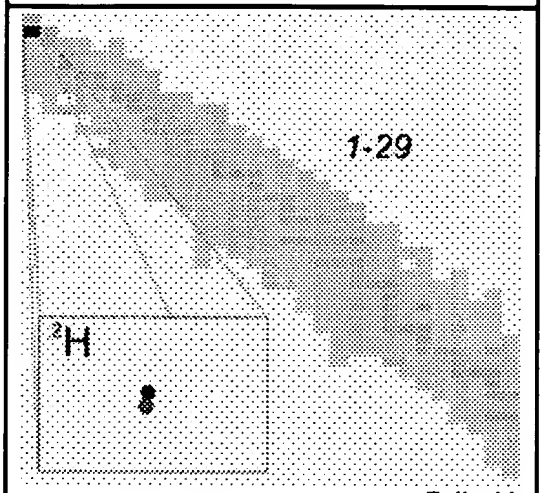
The chemical symbol ^2H identifies deuterium. The unofficial symbol D is also often used, even though deuterium is not a chemical element in its own right. It occurs naturally as deuterium gas, written $^2H_2$ or D_2. When bonded with a typical ^1H atom, the gas is called hydrogen deuteride.[1] (http://en.wikipedia.org/wiki/Deuterium#endnote_IUPACelement)

Deuterium behaves chemically identically to ordinary hydrogen, although, because of the greater atomic mass, reactions involving deuterium tend to occur at a somewhat slower reaction rate than the corresponding reactions involving ordinary hydrogen. The two isotopes can be distinguished physically by using mass spectrometry.

Deuterium can replace the normal hydrogen in water molecules to form heavy water (D_2O). Although not strictly toxic, consumption of heavy water could nevertheless pose a health threat.

The existence of deuterium in stars is an important datum in cosmology. Stellar fusion destroys deuterium, and there are no known natural processes, other than the Big Bang nucleosynthesis, which produce deuterium. Thus it is one of the arguments in favour of the Big Bang theory over the steady state theory of the universe.

The world's leading producer of deuterium is Canada, in the form of heavy water as neutron moderator for the operation of the CANDU reactor.

Hydrogen-2	
 Full table	
General	
Name, symbol	deuterium, ^2H
Neutrons	1
Protons	1
Nuclide Data	
Natural abundance	0.015%
Half-life	stable
Isotope mass	2.01355321270 u
Spin	1+
Excess energy	13135.720 ± 0.001 keV
Binding energy	2224.573 ± 0.002 keV

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Applications

Deuterium is useful in nuclear fusion reactions, especially in combination with tritium, because of the large reaction rate (or cross section) and high energy yield of the D-T reaction.

In chemistry and biochemistry, deuterium is used in tracer molecules to study chemical reactions and metabolic pathways because chemically it behaves identically to ordinary hydrogen, but it can be distinguished from ordinary hydrogen by its mass using mass spectrometry.